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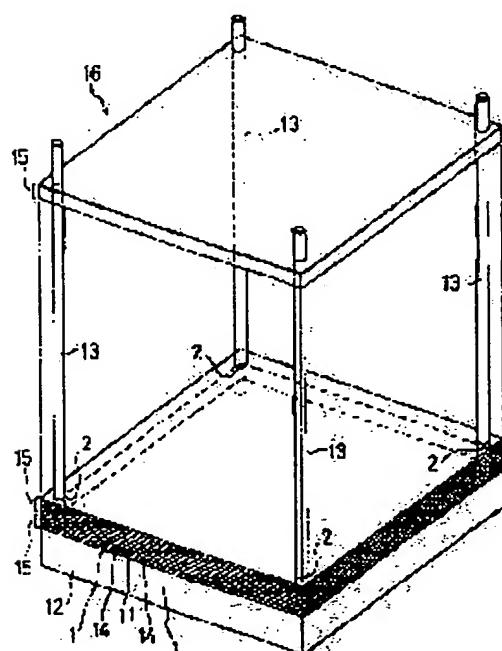
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## (54) ASSEMBLING METHOD FOR FUEL CELL



### (57)Abstract:

PROBLEM TO BE SOLVED: To establish a fuel cell assembling method which can stack up component parts in the form of flat plate constituting a fuel cell without misalignment, can assemble a stack which is accurate and is sealed perfectly, and can perform the assembly precisely and easily while the facing/heading of each component is distinguished easily to allow precise location and holding.

SOLUTION: A locating hole 2 for cell assembling is bored in a pressurizing plate for pressurization of a stack 16, and a long knock pin 13 of PTFE whose end face is chamfered, is inserted in this hole 2 and raised upright, and component parts in flat plate constituting a fuel cell are stacked one over another while their locating holes 2 are fitted on the knock pin 13, and thus an intended cell 15 is accomplished.

This operating cycle is repeated to correspond the necessary number of cells 15 so that a stack 16 is constructed, and then fastening is made using a pressurizing plate.

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[Claim 1] Set to assemble a fuel cell and the locating hole for cell assembly is drilled in the pressure plate for stack pressurization. Insert in this the long dowel pin made from PTFE which beveled the end face, and it stands straight. Next, fitting to the aforementioned dowel pin by each cell locating hole carries out the upper load layer of the plate-like parts which constitute the fuel cell which drilled the cell locating hole one by one, and constitute a cell and, subsequently necessary carries out the number repeat laminating of cells of this. The assembly method of the fuel cell characterized by constituting a stack, and binding tight and fixing using an appropriate post-pressurization plate.

[Claim 2] The assembly method of the fuel cell characterized by setting assembling a fuel cell, making into a rectangle the flat-surface configuration of the plate-like parts which constitute a fuel cell, beveling a corner of the four corners, discriminating the front reverse side of parts, and a direction by the mark, and nothing and its mark, and carrying out a laminating after positioning.

[Claim 3] Set to assemble a fuel cell and the locating hole for cell assembly is drilled in the pressure plate for stack pressurization. Insert in this the long dowel pin made from PTFE which beveled the end face, and it stands straight. The flat-surface configuration of the plate-like parts which constitute a fuel cell is made into a rectangle, and while drilling a cell locating hole in the plate-like part, a corner of the four corners is beveled. Next, nothing [ a mark and nothing ], Subsequently, discriminate the front reverse side of parts, and a direction by the mark, and each cell locating hole is fitted into the aforementioned dowel pin one by one in parts after positioning. The assembly method of the fuel cell which carries out a laminating, and a cell is constituted, and necessary next carries out the number repeat laminating of cells of this, and is characterized by constituting a stack, and binding tight and fixing using an appropriate post-pressurization plate.

## EXAMPLE

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[Example] When drawing explains one example [ one ] of the assembly method of the fuel cell of this invention, it is thickness as shown in drawing 1 . 0.3mm, one side To the corner of the carbon plate (a gas plate and cooling plate) 1 of a 120mm rectangle, it is a bore. The 5.3mm locating hole 2 for cell assembly was drilled. In addition, when as for a gas-passageway slot and 6 for the gas inlet manifold and 9 a gas inlet manifold and 5 are gas outlet manifolds and the gas-passageway slot on on the back and 8 are [ a gas outlet manifold and 7 / its carbon plates 1 ] cooling plates, as for 4, the cooling water path slot, the inflow-of-cooling-water manifold, and the outflow-of-cooling-water manifold are formed in the front face.

[0015] Drawing 2 is thickness which allots between the carbon plates 1 and carries out the seal of the circumference of each manifold. It is the 0.4mm sealing strip 10, and the locating hole 2 for cell assembly with a bore of 5.3mm was drilled in the corner like the aforementioned carbon plate 1.

[0016] Drawing 3 is 0.14mm in thickness put through a sealing strip 10 between the gas plates 1, and one side. It is the Nafion film 11 for electrolysis of a 120mm rectangle, it has the manifold respectively like the aforementioned carbon plate 1, and is a bore to the corner of this. The 5.3mm locating hole 2 for cell assembly was drilled.

[0017] The diameter of 5mm, length which beveled the end face to the locating hole 2 for cell assembly of a pressure plate 12 as very shown in drawing 4 The 400mm dowel pin 13 made from PTFE was inserted, and was uprighted.

[0018] Next, as shown in this dowel pin 13 at drawing 5 , with the cell locating hole 2, fit in and the carbon plate (cooling plate) 1 is positioned. Position a sealing strip 10 similarly henceforth and the polymerization of the catalyst electrode 14 is carried out to a predetermined place. Carry out the polymerization of the Nafion film 11 and the catalyst electrode 14 to a predetermined place, carry out the positioning laminating of a sealing strip 10 and the carbon plate (cooling plate) 1 similarly, and a cell 15 is constituted. Subsequently, necessary carried out the number repeat laminating of cells of this, the stack 16 was constituted, as shown in appropriate back drawing 6 , with the locating hole 2, it fitted in and the pressurization plate 17 was piled up, and it bound tight and fixed with the bolt 18 and the nut 19.

[0019] As mentioned above by the assembly method of the fuel cell of an example Since it fits in one by one, the locating hole 2 of the plate-like each part article which the dowel pin 13 made from PTFE which beveled the end face is inserted, is uprighted to the locating hole 2 for cell assembly of a pressure plate 12, and constitutes a fuel cell in this dowel pin 13 Moreover, slipping fitted in smoothly [ it is good and ], the dowel pin 13 was pliant, since it was elastic, some position gap could also be absorbed and the cell 15 and the stack 16 were assembled with high precision.

[0020] Furthermore, the stack 16 which is a moderate flexible structure object when a cell 15 and a stack 16 can be certainly held since it does not melt with the heat according [ a dowel pin 13 ] to power generation since each cell 15 does not short-circuit since a dowel pin 13 is insulating, and there is thermal resistance and excels in material strength further, and a bolt 18 and a nut 19 fasten using the pressurization plate 17 is fixed, and the seal of the cell 15 is carried out completely.

[0021] Next, if drawing explains other one example [ one ] of the assembly method of the fuel cell of this invention Carbon plate 1' shown in drawing 7 which constitutes a fuel cell, Nafion film 11', Flat-surface configuration of sealing-strip 10' It considers as the rectangle of 120mmx 140mm. A 60mmx60mm hole is established in the center section of sealing-strip 10', catalyst electrode 14' is made into a 60mmx60mm square, and it sets to a corner of the four corners, and drawing respectively. a lower left angle for an upper right corner at the time of part processing as a zero (0 0) As beveled in length of 2mm with a 45-degree taper, the front reverse side of each part article and a direction were discriminated by the mark 20, and nothing and its mark 20, positioning carried out an upper 75-sheet laminating and it was shown in drawing 8 , stack 16' was assembled.

[0022] It has checked that the mark 20 of beveling of a place and an upper right angle which carried out visual inspection was together with all of all 75 sheets after an assembly, and there was no error.

[0023] One side shown in drawing 9 by the conventional method on the other hand Carbon plate 1" of a rectangle (120mm and 60mm), Since any obstacle cannot be found and it is assembled 11" of Nafion films even if it assembles, as for example, 90-degree carbon plate 1" should be rotated on the way and it is shown in drawing 10 when the 75-sheet laminating of the 14" of the catalyst electrodes is carried out carefully, sealing-strip 10" and When it has not noticed but work was done, in the visual inspection after an assembly end, it could not discover and it does not understand that all are not

decomposed. And decomposition and assembly had to be repeated until it became clear that the test which pours gas or cooling water is performed, and there is no error, after assembling again.

[0024] Subsequently, if drawing explains one example [ one ] of further others of the assembly method of the fuel cell of this invention Carbon plate (gas plate and cooling plate) 1' shown in drawing 11 which constitutes a fuel cell, Flat-surface configurations, such as sealing-strip 10' and Nafion film 11' catalyst electrode 14' It considers as the rectangle of 120mmx 140mm. In a corner of the four corners, and drawing, a lower left angle is beveled for an upper right corner in length of 2mm with a 45-degree taper as a zero (0 0) at the time of part processing, and it is a bore to the corner of parts in a mark 20, nothing, and this. The 5.3mm locating hole 2 for cell assembly was drilled. Be very shown in drawing 12. The diameter of 5mm, length which beveled the end face to the locating hole 2 for cell assembly of pressure-plate 12' of the rectangle of 120mmx 140mm The 400mm dowel pin 13 made from PTFE was inserted, and was uprighted.

[0025] To this dowel pin 13, next, the aforementioned each part article, i.e., carbon plate 1', The front reverse side and a direction are discriminated for sealing-strip 10', catalyst electrode 14', Nafion film 11', catalyst electrode 14', sealing-strip 10', and carbon plate 1' by the mark 20 each one. As a positioning laminating is fitted in and carried out with the cell locating hole 2 and it is shown in drawing 12, cell 15' is constituted. Subsequently, in the necessary number of cells, and this example, carry out 29 cell repeat laminating of this, and stack 16' is constituted. As shown in appropriate back drawing 13, consider as the flat-surface configuration of the same size as the aforementioned each part article, and bevel a corner, and a mark 20 is put. And it is a bore to a corner. After discriminating the front reverse side of processing plate 17' which drilled the 5.3mm locating hole 2 for assembly, and a direction by the mark 20, it fitted into the dowel pin 13 with the cell locating hole 2, put on stack 16', and bound tight and fixed with the bolt 18 and the nut 19.

[0026] In this way, positioning maintenance of each part article was carried out correctly, and assembled stack 16' had a high precision, the seal's was perfect, and did not have generating of a defective.

## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[The technical field to which invention belongs] this invention relates surely the plate-like parts which are applied to the assembly method of a fuel cell, especially constitute a fuel cell to the assembly method of positioning and the fuel cell which can carry out a laminating and which can be assembled easily.

#### [0002]

[Description of the Prior Art] In order to have assembled the solid-state polyelectrolyte fuel cell conventionally, after having carried out the seal of carbon plates, such as a gas plate and a cooling plate, the Nafion film, the catalyst electrode, etc. through the sealing strip, constituting the cell, carrying out several layers - the ten-layer laminating of this cell of numbers and assembling a stack, it was binding tight and fixing using the plate for pressurization.

[0003] By the way, the more there were many laminatings of a cell, the more, it was difficult to carry out a laminating, and the position gap arose on the parts which carried out the laminating, and the bird clapper had a seal imperfectly.

[0004] Moreover, in order that there may be no mark which shows the front reverse side, a normal direction, and an angle to each part article in the laminating of many plate-like parts, the direction in which it mistakes, and the laminating of the table and the reverse side of parts should be carried out, or they should be installed accidentally -- 90 degrees - - or -- Mistake 180 degrees and a laminating is carried out. The error has not been noticed, but the laminating of all the remaining parts was carried out, they were assembled, un-arranging arose after the assembly end of a fuel cell in the test which pours gas or cooling water, and the situation which that the error was in the laminating of one of parts makes clear arose frequently.

[0005]

[Problem(s) to be Solved by the Invention] Then, this invention tends to offer the method of carrying out a laminating, and being able to constitute a stack, carrying out a seal with high precision and completely, and assembling a fuel cell, without carrying out a laminating, constituting a cell, without carrying out the position gap of the plate-like parts which constitute a fuel cell, and carrying out the position gap also of this cell.

[0006] Moreover, in the laminating of the plate-like parts which constitute a fuel cell, while being able to lose the mistake of the front reverse side of each part article, or the installation direction, it is going to offer the assembly method of a fuel cell that after an assembly end can be checked by inspecting appearance from the exterior.

[0007]

[Means for Solving the Problem] One of the assembly methods of the fuel cell of this invention for solving the above-mentioned technical problem Set to assemble a fuel cell and the locating hole for cell assembly is drilled in the pressure plate for stack pressurization. Insert in this the long dowel pin made from PTFE which beveled the end face, and it stands straight. Next, fitting to the aforementioned dowel pin by each cell locating hole carries out the upper load layer of the plate-like parts which constitute the fuel cell which drilled the cell locating hole one by one, and a cell is constituted.

Subsequently, this is characterized into the necessary number repeat of cells, and a laminating is carried out, and a stack is constituted and it is characterized by binding tight and fixing using an appropriate post-pressurization plate.

[0008] Other one of the assembly methods of the fuel cell of this invention is characterized by making into a rectangle the flat-surface configuration of the plate-like parts which constitute a fuel cell, beveling a corner of the four corners, discriminating the front reverse side of parts, and a direction by the mark, and nothing and its mark, and carrying out a laminating after positioning.

[0009] One of the assembly methods of the fuel cell of this invention of further others Drill the locating hole for cell assembly in the pressure plate for stack pressurization, and insert the long dowel pin made from PTFE which beveled the end face to this, and it stands straight. The flat-surface configuration of the plate-like parts which constitute a fuel cell is made into a rectangle, and while drilling a cell locating hole in the plate-like part, a corner of the four corners is beveled. Next, nothing [ a mark and nothing ], Subsequently, discriminate the front reverse side of parts, and a direction by the mark, and each cell locating hole is fitted into the aforementioned dowel pin one by one in parts

after positioning. A laminating is carried out, and a cell is constituted and next necessary carries out the number repeat laminating of cells of this, and a stack is constituted and it is characterized by binding tight and fixing using an appropriate post-pressurization plate. [0010]

[Function] As mentioned above one of the assembly methods of the fuel cell of this invention Drill the locating hole for cell assembly in the pressure plate for stack pressurization, and insert the long dowel pin made from PTFE which beveled the end face to this, and it stands straight. Since fitting to the aforementioned dowel pin by each cell locating hole carries out the upper load layer of the plate-like parts which constitute the fuel cell which drilled the cell locating hole in this one by one In the case of this laminating, moreover, the dowel pin made from PTFE can have good slipping, and plate-like parts have a pliant dowel pin, they tend to fit in and can also absorb [ they are elastic and ] the position gap of the some of plate-like parts. Therefore, a cell and a stack are easily assembled with a sufficient precision.

[0011] Moreover, since a dowel pin does not melt with the heat by power generation since each cell does not short-circuit since a dowel pin is insulating, and there is moreover thermal resistance, and it moreover excels in material strength, if a cell and a stack can be held certainly and it fastens using a pressurization plate, the stack which is a moderate flexible structure object will be fixed, and the seal of each cell will be carried out completely.

[0012] Since other one of the assembly methods of the fuel cell of this invention makes a rectangle the flat-surface configuration of plate-like parts as mentioned above, and a corner of the four corners is beveled and it considers as a mark, even if it changes the front reverse side of plate-like parts, and a direction, as for the front reverse side and the direction whose beveling position corresponds, only one exists. Therefore, the front reverse side of plate-like parts and a direction discriminate easily, and the laminating of them can be correctly carried out after positioning.

[0013] As mentioned above, it can make a seal perfect while it can carry out positioning maintenance of the plate-like parts correctly and can assemble a cell and a stack with a sufficient precision easily, since one of the assembly methods of the fuel cell of this invention of further others mixes the two previous assembly methods.

[0014]

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technological development center**Abstract****(57)【要約】**

(修正有)

**【課題】**

燃料電池を構成する平板状の部品を位置ずれすることなく積層できて、高精度且つ完全シールのスタッフを組み立てることのできる方法及び平板状の部品の表裏、方向を容易に識別して、正確に位置決め保持して精度良く容易に組み立てることのできる方法を提供す

(57) [Abstract]

(There is an amendment.)

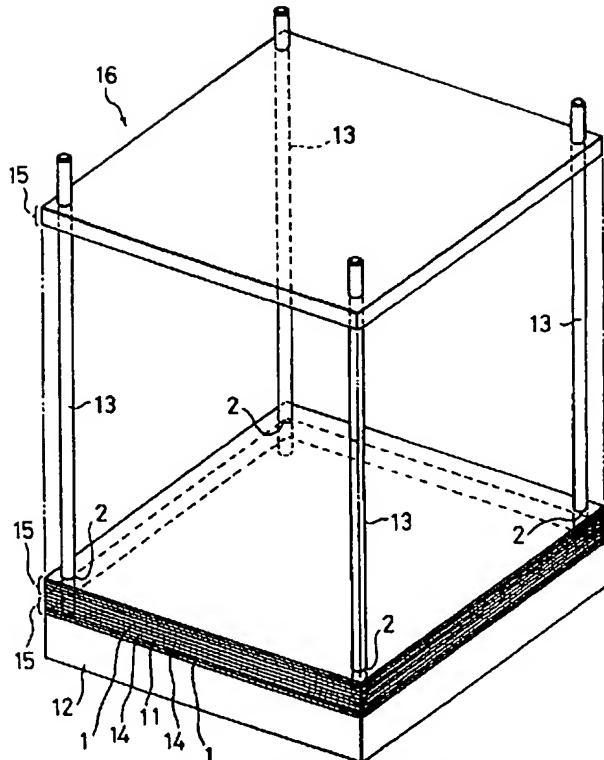
[Problems to be Solved by the Invention]

laminate it being possible without positional deviation doing part of the flat plate forming fuel cell, identifying front and back, direction of part of method and flat plate which can assemble stack of high precision and complete seal easily, registration keeping accurately, method which precision well can assemble easily is offered.

る。

## 【解決手段】

[Means to Solve the Problems]



スタック 16 加圧用の加圧板にセル組立用位置決め穴 2 を穿設し、これに端面を面取りした長いPTFE製のノックピン 13 を挿入して直立し、次にセル 15 位置決め穴 2 を穿設した燃料電池構成用平板状部品を順次各々のセル 15 位置決め穴を前記ノックピン 13 に嵌合の上積層してセル 15 を構成し、次いでこれを所要のセル 15 数繰り返し積層してスタック 16 を構成し、然る後加圧プレートを用いて締め付け固定することを特徴とする燃料電池の組立方法。

registration hole 2 for cell assembly was installed in adding pressure plate for stack 16 pressurization, inserting knock pin 13 of long PTFE where endface chamfer was done in this, it stands upright, flat plate part for fuel cell constitution which installs cell 15 position position deciding hole 2 next upperload layer of work designating each cell 15 position position deciding hole of sequential as aforementioned knock pin 13, it forms cell 15, Next, quantity of necessary cell 15 repeatedly laminating this, it forms stack 16, it tightens after that making use of compressed plate and locks assembly method. of fuel cell which is made feature

**Claims****【特許請求の範囲】****【請求項 1】**

燃料電池を組み立てるに於いて、スタッカ用の加圧板にセル組立用位置決め穴を穿設し、これに端面を面取りした長いPTFE製のノックピンを挿入して直立し、次にセル位置決め穴を穿設した燃料電池を構成する平板状の部品を順次各々のセル位置決め穴を前記ノックピンに嵌合の上積層してセルを構成し、次いでこれを所要のセル数繰り返し積層して、スタッカを構成し、然る後加圧プレートを用いて締め付け固定することを特徴とする燃料電池の組立方法。

**【請求項 2】**

燃料電池を組み立てるに於いて、燃料電池を構成する平板状の部品の平面形状を長方形とし、その四隅の内の二隅を面取りして目印となし、その目印により部品の表裏、方向を識別して位置決めの上、積層することを特徴とする燃料電池の組立方法。

**【請求項 3】**

燃料電池を組み立てるに於いて、スタッカ用の加圧板にセル組立用位置決め穴を穿設し、これに端面を面取りした長いPTFE製のノックピンを挿入して直立し、次に燃料電池を構成する平板状の部品の平面形状を長方形とし、その平板状の部品にセル位置決め穴を穿設すると共に四隅の内の二隅を面取りして目印となし、次いでその目印により部品の表裏、方向を識別して位置決めの上、部品を順次各々のセル位置決め穴を前記ノックピンに嵌合し、積層してセルを構成し、次にこれを所要のセル数繰り返し積層してスタッカを構成し、然る後加圧プレートを用いて締め付け固定することを特徴とする燃料電池の組立方法。

**Specification****【発明の詳細な説明】****【0001】****【発明の属する技術分野】**

本発明は燃料電池の組立方法に係り、特に燃料電池を構成する平板状の部品を正しく位置決め、積層して容易に組み立てることのできる燃料電池の組立方法に関する。

**[Claim(s)]****[Claim 1]**

fuel cell is assembled regarding, registration hole for cell assembly was installed in adding pressure plate for stack pressurization, inserting the knock pin of long PTFE where endface chamfer was done in this, it stands upright, part of flat plate which forms fuel cell which installs cell registration hole next upper load layer of work designating each cell registration hole of sequential as aforementioned knock pin, it forms the cell, Next, necessary number of cells repeatedly laminating this, it forms the stack, it tightens after that making use of compressed plate andlocks assembly method. of fuel cell which is made feature

**[Claim 2]**

Designating flat surface form of part of flat plate which assembles fuel cell regarding, forms fuel cell as rectangle, chamfer doing the corner among four corners and identifying front and back, direction of the part due to marking and forming and marking on registration, it laminates assembly method. of fuel cell which is made feature

**[Claim 3]**

fuel cell is assembled regarding, registration hole for cell assembly was installed in adding pressure plate for stack pressurization, inserting the knock pin of long PTFE where endface chamfer was done in this, it stands upright, it designates flat surface form of part of flat plate which forms fuel cell next as rectangle, As cell registration hole is installed in part of flat plate, chamfer doing corner among four corners, marking it forms, identifying the front and back, direction of part due to marking next, on registration, the part each cell registration hole of sequential it engages to aforementioned knock pin, laminates and forms cell, Necessary number of cells repeatedly laminating this next, it forms the stack, it tightens after that making use of compressed plate andlocks assembly method. of fuel cell which is made feature

**[Description of the Invention]****【0001】****[Technological Field of Invention]**

this invention relates to assembly method of fuel cell, registration, laminating the part of flat plate which forms especially fuel cell correctly, regards assembly method of fuel cell which can assemble easily.

【0002】

## 【従来の技術】

従来、固体高分子電解質燃料電池を組み立てるには、ガスプレート、冷却プレート等のカーボンプレート、ナフィオン膜、触媒電極等をシールプレートを介してシールしてセルを構成し、このセルを数層～数10層積層してスタックを組み立てた上、加圧用プレートを用いて締め付け固定していた。

【0003】

ところで、セルの積層数が多ければ多い程積層することが難しく、また、積層した部品には位置ずれが生じてシールが不完全になることがあった。

【0004】

また、多数の平板状の部品の積層に於いて、各部品に表裏や正常な方向や角度を示す目印が無いため、誤って部品の表と裏を間違えて積層したり、設置すべき方向を90°又は180°間違えて積層して、その誤りに気付かず残りの部品を全て積層して組み立て、燃料電池の組み立て終了後、ガス又は冷却水を流すテストに於いて不都合が生じ、いずれかの部品の積層に誤りがあったことが判明する事態がたびたび生じていた。

【0005】

## 【発明が解決しようとする課題】

そこで本発明は、燃料電池を構成する平板状の部品を位置ずれすることなく積層してセルを構成し、このセルも位置ずれすることなく積層してスタックを構成して、高精度に且つ完全にシールして燃料電池を組み立てることのできる方法を提供しようとするものである。

【0006】

また、燃料電池を構成する平板状の部品の積層に於いて、各部品の表裏や設置方向の間違いを無くすことができると共に、組み立て終了後も外部から外観を検査することにより確認できる燃料電池の組立方法を提供しようとするものである。

【0007】

## 【課題を解決するための手段】

【0002】

## 【Prior Art】

Until recently, to assemble solid polymeric electrolyte fuel cell, gas plate, cooling plate or other carbon plate, Nafion film, catalyst electrode etc, through the seal plate, seal doing, it formed cell, several layers～several 10 layer laminated this cell and after assembling stack, it tightened making use of plate for pressurization and was fixed.

【0003】

If by way, number of laminated layers of cell is many, many extent it laminates to be difficult, in addition, positional deviation occurring in part which is laminated, seal becomes imperfect, was.

【0004】

In addition, regarding to laminate of part of multiple flat plate, because a front and back and a normal direction and a marking which shows angle there is not in each part, mistaking, making a mistake in front and back of the part, 90 deg or 180 deg making a mistake in direction which it laminates, should install laminating, all laminating the remaining part not to become aware in error, assembly, After assembly ending of fuel cell, regarding to test which lets flow gas or cooling water, situation where undesirable occurred, was error in laminate of part of any and is ascertained often occurred.

【0005】

## 【Problems to be Solved by the Invention】

It is something which this invention laminating without positional deviation doing the part of flat plate which forms fuel cell laminating either this cell without positional deviation doing, forming stack, and seal doing completely in high precision, tries will form cell, to offer method which can assemble fuel cell then.

【0006】

In addition, regarding to laminate of part of flat plate which forms fuel cell, you lose front and back of each part and mistake of mounting direction, as it is possible, it is something which it will assemble after ending to offer assembly method of fuel cell which can be verified by inspecting external appearance from outside it tries.

【0007】

## 【Means to Solve the Problems】

上記課題を解決するための本発明の燃料電池の組立方法の1つは、燃料電池を組み立てるに於いて、スタック加圧用の加圧板にセル組立用位置決め穴を穿設し、これに端面を面取りした長いPTFE製のノックピンを挿入して直立し、次にセル位置決め穴を穿設した燃料電池を構成する平板状の部品を順次各々のセル位置決め穴を前記ノックピンに嵌合の上積層してセルを構成し、次いでこれを所要のセル数繰り返し、積層してスタッ�を構成し、然る後加圧プレートを用いて締め付け固定することを特徴とするものである。

#### 【0008】

本発明の燃料電池の組立方法の他の1つは、燃料電池を構成する平板状の部品の平面形状を長方形とし、その四隅の内の一隅を面取りして目印となし、その目印により部品の表裏、方向を識別して位置決めの上、積層することを特徴とするものである。

#### 【0009】

本発明の燃料電池の組立方法のさらに他の1つは、スタッ�加圧用の加圧板にセル組立用の位置決め穴を穿設し、これに端面を面取りした長いPTFE製のノックピンを挿入して直立し、次に燃料電池を構成する平板状の部品の平面形状を長方形とし、その平板状の部品にセル位置決め穴を穿設すると共に四隅の内の一隅を面取りして目印となし、次いでその目印により部品の表裏、方向を識別して位置決めの上、部品を順次各々のセル位置決め穴を前記ノックピンに嵌合し、積層してセルを構成し、次にこれを所要のセル数繰り返し積層してスタッ�を構成し、然る後加圧プレートを用いて締め付け固定することを特徴とするものである。

#### 【0010】

#### 【作用】

前述のように本発明の燃料電池の組立方法の1つは、スタッ�加圧用の加圧板にセル組立用位置決め穴を穿設し、これに端面を面取りした長いPTFE製のノックピンを挿入して直立し、これにセル位置決め穴を穿設した燃料電池を構成する平板状の部品を順次各々のセル位置決め穴を前記ノックピンに嵌合の上積層するので、この積層の際、PTFE製のノックピンは滑りが良く、平板状の部品は嵌合し易く、しかもノックピンがしなやかで弾力性

Inserting knock pin of long PTFE where one of assembly method of fuel cell of this invention in order to solve above-mentioned problem, fuel cell is assembled regarding, installed registration hole for the cell assembly in adding pressure plate for stack pressurization, chamfer did the endface in this, it stands upright, part of flat plate which forms fuel cell which installs cell registration hole next upper load layer of work designating each cell registration hole of the sequential as aforementioned knock pin, it forms cell, necessary number of cells repeats this next, laminates and forms stack, it tightens and after that making use of compressed plate it locks it is something which is made feature.

#### 【0008】

Other one of assembly method of fuel cell of this invention designating the flat surface form of part of flat plate which forms fuel cell as the rectangle, chamfer doing corner among four corners and identifying the front and back, direction of part due to marking and forming and the marking on registration, it laminates it is something which is made feature.

#### 【0009】

Inserting knock pin of long PTFE where furthermore other one of assembly method of fuel cell of this invention installed registration hole for cell assembly in adding pressure plate for stack pressurization, chamfer did endface in this, it stands upright, it designates flat surface form of part of flat plate which forms fuel cell next as rectangle, As cell registration hole is installed in part of flat plate, chamfer doing corner among four corners, marking it forms, identifying the front and back, direction of part due to marking next, on registration, the part each cell registration hole of sequential it engages to aforementioned knock pin, laminates and forms cell, Necessary number of cells repeatedly laminating this next, it forms the stack, it tightens and after that making use of compressed plate it locks it is something which is made feature.

#### 【0010】

#### 【Working Principle】

Aforementioned way inserting knock pin of long PTFE where the one of assembly method of fuel cell of this invention installed registration hole for cell assembly in adding pressure plate for stack pressurization, chamfer did endface in this, it stands upright, Because part of flat plate which forms fuel cell which installs cell registration hole in this each cell registration hole of sequential upper load layer of work is designated as aforementioned knock pin, case of this laminate, knock pin of PTFE slip to be good, part of the flat plate to be easy to engage, furthermore knock pin being

があって、平板状の部品の若干の位置ずれも吸収できる。

従って、セル及びスタックが精度良く容易に組み立てられる。

#### 【0011】

また、ノックピンは、絶縁性があるので、各セルがショートすることなく、しかも耐熱性があるので、ノックピンは発電による熱により溶けることがなく、その上、材料強度に優れるので、セル及びスタックを確実に保持でき、加圧プレートを用いて締め込むと、適度な柔構造体であるスタックは固定され且つ各セルが完全にシールされる。

#### 【0012】

前述のように本発明の燃料電池の組立方法の他の1つは、平板状の部品の平面形状を長方形とし、その四隅の内の1隅を面取りして目印とするので、平板状の部品の表裏、方向を変えても面取り位置が一致する表裏、方向は1つしか存在しない。

従って、平板状の部品の表裏、方向が容易に識別して正確に位置決めの上、積層できる。

#### 【0013】

前述のように本発明の燃料電池の組立方法のさらに他の1つは、さきの二つの組立方法と一緒にしたものであるから、平板状の部品を正確に位置決め保持して、精度良くセル及びスタックを容易に組み立てることができると共にシールを完全にできる。

#### 【0014】

##### 【実施例】

本発明の燃料電池の組立方法の1つの実施例を図によって説明すると、図1に示すように厚さ 0.3mm、一辺 120mm の方形のカーボンプレート(ガスプレート及び冷却プレート)1の隅部に、内径 5.3mm のセル組立用位置決め穴 2 を穿設した。

尚、4はガス入口マニホールド、5はガス通路溝、6はガス出口マニホールド、7は裏面のガス通路溝、8はそのガス入口マニホールド、9はガス出口マニホールドであり、カーボンプレート 1 が冷却プレートの場合は、表面に冷却水通路溝、冷却水入口マニホールド、冷却水出口マニホールドが設けられている。

softly, there being a elasticity, It can absorb also somewhat positional deviation of part of flat plate.

Therefore, precision it can assemble cell and stack well easily.

#### 【0011】

In addition, because knock pin is an insulating property, because each cell the short does not to be, furthermore is a heat resistance, knock pin dissolves with generation of electricity with heat not to be, because on that, it is superior in material intensity, be able to keep the cell and stack securely, when it screws making use of the compressed plate, suitable softly stack which is a structure is locked and each cell is done seal completely.

#### 【0012】

Aforementioned way other one of assembly method of fuel cell of this invention to designate flat surface form of part of flat plate as the rectangle, chamfer doing corner among four corners, because it makes marking, changing front and back, direction of part of flat plate, the front and back, direction where chamfer position agrees exists only one.

Therefore, front and back, direction of part of flat plate identifying easily, on registration, laminate it is possible accurately.

#### 【0013】

Aforementioned way because furthermore other one of the assembly method of fuel cell of this invention is something which makes assembly method of two ahead simultaneous, registration keeping part of flat plate accurately, precision to be good it assembles cell and stack easily, as it is possible, it can make seal complete.

#### 【0014】

##### 【Working Example(s)】

When one Working Example of one of assembly method of fuel cell of this invention is explained in figure, as shown in Figure 1, carbon plate of square of thickness 0.3 mm, one edge 120 mm (gas plate and cooling plate) in corner of 1, registration hole 2 for cell assembly of the inner diameter 5.3 mm was installed.

Furthermore as for 4 as for gas inlet manifold, 5 as for gas passage slot, 6 as for the gas outlet manifold, 7 as for gas passage slot, 8 of back surface as for gas inlet manifold, 9 when with the gas outlet manifold, carbon plate 1 is cooling plate, cooling water duct slot, cooling water entrance manifold, cooling water exit manifold is provided in surface.

## 【0015】

図2は、カーボンプレート1間に配して各マニホールドの周囲をシールする厚さ0.4mmのシールプレート10で、前記カーボンプレート1と同様に隅部に、内径5.3mmのセル組立用位置決め穴2を穿設した。

## 【0016】

図3は、ガスプレート1間にシールプレート10を介して挟み込む厚さ0.14mm、一辺120mmの方形の電解用のナフィオン膜11で、前記カーボンプレート1と同様に各々マニホールドを有していて、これの隅部に内径5.3mmのセル組立用位置決め穴2を穿設した。

## 【0017】

然して図4に示すように加圧板12のセル組立用位置決め穴2に端面を面取りした直径5mm、長さ400mmのPTFE製のノックピン13を挿入して直立させた。

## 【0018】

次にこのノックピン13に図5に示すようにカーボンプレート(冷却プレート)1をセル位置決め穴2にて嵌合して位置決めし、以後シールプレート10を同様に位置決めし、触媒電極14を所定の場所に重合し、ナフィオン膜11、触媒電極14を所定の場所に重合し、シールプレート10、カーボンプレート(冷却プレート)1を同様に位置決め積層してセル15を構成し、次いでこれを所要のセル数繰り返し積層してスタック16を構成し、然る後図6に示すように加圧プレート17を位置決め穴2にて嵌合して重ね、ボルト18、ナット19にて締め付け固定した。

## 【0019】

上記のように実施例の燃料電池の組立方法では、加圧板12のセル組立用位置決め穴2に端面を面取りしたPTFE製のノックピン13を挿入して直立させ、このノックピン13に燃料電池を構成する平板状の各部品の位置決め穴2を順次嵌合するので、滑りが良くてスムーズに嵌合し、しかもノックピン13がしなやかで弾力性があるので、若干の位置ずれも吸収でき、セル15及びスタック16が高精度に組み立てられた。

## 【0020】

## [0015]

Figure 2, allotting between carbon plate 1, with seal plate 10 of thickness 0.4 mm which seal does periphery of each manifold, in corner, installed registration hole 2 for cell assembly of inner diameter 5.3 mm in same way as the aforementioned carbon plate 1.

## [0016]

Figure 3, through seal plate 10 between gas plate 1, with Nafion film 11 for the electrolysis of square of thickness 0.14 mm, one edge 120 mm which is inserted, having possessed each manifold in same way as aforementioned carbon plate 1, installed the registration hole 2 for cell assembly of inner diameter 5.3 mm in this corner.

## [0017]

Therefore as shown in Figure 4, inserting knock pin 13 of PTFE of diameter 5 mm, length 400 mm which endface chamfer is done in registration hole 2 for the cell assembly of adding pressure plate 12, it stood upright.

## [0018]

As in this knock pin 13 shown next in Figure 5, carbon plate (cooling plate) engaging in cell registration hole 2, registration it does 1, registration does from now on seal plate 10 in same way, polymerizes catalyst electrode 14 to predetermined site, Nafion film 11, catalyst electrode 14 polymerizes to predetermined site, seal plate 10, carbon plate (cooling plate) registration laminates 1 in the same way and forms cell 15, necessary number of cells repeatedly laminates this next and forms stack 16, After that as shown in Figure 6, engaging in registration hole 2, you repeated compressed plate 17, tightened locked with volt 18, nut 19 and.

## [0019]

As description above because with assembly method of fuel cell of Working Example, in registration hole 2 for cell assembly of adding pressure plate 12 inserting knock pin 13 of PTFE which endface chamfer is done, standing upright, registration hole 2 of each part of flat plate which forms fuel cell in this knock pin 13 sequential you engage, slip being good, smoothly you engage, Furthermore knock pin 13 being softly, because there is a elasticity, be able to absorb also somewhat positional deviation, it could assemble cell 15 and the stack 16 in high precision.

## [0020]

さらに、ノックピン 13 は絶縁性があるので、各セル 15 ガショートすることができなく、また耐熱性があるので、ノックピン 13 は発電による熱により溶けることができなく、さらに材料強度に優れているので、セル 15 及びスタック 16 を確実に保持でき、加圧プレート 17 を用いてボルト 18、ナット 19 により締め込むと、適度な柔構造体であるスタック 16 は固定され且つセル 15 が完全にシールされる。

## 【0021】

次に本発明の燃料電池の組立方法の他の 1 つの一実施例を図によって説明すると、燃料電池を構成する図 7 に示すカーボンプレート 1'、ナフィオン膜 11'、シールプレート 10' の平面形状を 120mm×140mm の長方形とし、シールプレート 10' の中央部には 60mm×60mm の穴を設け、触媒電極 14' を 60mm×60mm の正方形とし、各々その四隅の内の一隅、図に於いて右上の角部を部品加工時左下の角を原点(0,0)として、45°のテーバで長さ 2mm に面取りして目印 20 となし、その目印 20 により各部品の表裏、方向を識別して位置決めの上 75 枚積層して図 8 に示すようにスタック 16' を組み立てた。

## 【0022】

組み立て後、外観検査した処、右上角の面取りの目印 20 が 75 枚全てそろっていて、誤りの無いことを確認できた。

## 【0023】

一方、従来法によって図 9 に示す一辺 120mm 及び 60mm の方形のカーボンプレート 1"、ナフィオン膜 11"、シールプレート 10"、触媒電極 14" を注意深く 75 枚積層した際、万一途中で例えばカーボンプレート 1" を 90°回転して図 10 に示すように組み立てても何の障害もなく組み立てられるので、気付かず作業が行われると、組み立て終了後外観検査では発見できず、全てを分解しないと判らなかつた。

そして再び組み立てた後、ガス又は冷却水を流すテストを行って誤りが無いことが判明するまで、分解、組立を繰り返さなければならなかつた。

## 【0024】

次いで本発明の燃料電池の組立方法のさらには他の 1 つの一実施例を図によって説明すると、燃料電池を構成する図 11 に示すカーボン

Furthermore, because knock pin 13 is a insulating property, because each cell 15 the short does not to be, in addition is a heat resistance, knock pin 13 dissolves with generation of electricity with heat not to be, because furthermore it is superior in material intensity, be able to keep the cell 15 and stack 16 securely, making use of compressed plate 17 whenit screws with volt 18, nut 19, suitable softly stack 16 which is a structure is locked and and the cell 15 is done seal completely.

## 【0021】

When one Working Example of other one of assembly method of fuel cell of the this invention is explained next in figure, to designate flat surface form of carbon plate 1', Nafion film 11', seal plate 10' which is shown in Figure 7 which forms fuel cell as the rectangle of 120 mm X 140 mm, to provide hole of 60 mm X 60 mm in central portion of seal plate 10', to designate catalyst electrode 14' as square of 60 mm X 60 mm, corneramong four corners of each, Regarding to figure, at time of part processing with the taper of 45 deg chamfer making length 2 mm origin (0 and 0) as with theangle of bottom left, identifying front and back, direction of each part dueto marking 20, and forming and marking 20 on registration 75 laminating corner of top right, as shown in Figure 8, it assembled stack 16'.

## 【0022】

After assembling, external appearance marking 20 of chamfer of place and top right angle which are inspected having been even 75 all, thereis not a error, you could verify .

## 【0023】

On one hand, occasion where carbon plate 1"、Nafion film 11"、 seal plate 10"、 catalyst electrode 14" of square of one edge 120 mm and 60 mm which with prior art method are shown in Figure 9 is laminatednote 75 deeply, as unlikely event midway for example carbon plate 1" 90 deg turning, shown in Figure 10, assembling, what because it is assembled damage without, when you do not become aware and job is done, Not be able to discover with external appearance inspection after assemblyending, you did not understand that all is not disassembled.

And after again assembling, doing test which lets flow gas or cooling water, there is not a error, until it is ascertained ,disassembly and assembly must be repeated.

## 【0024】

Next, when furthermore one Working Example of other one of assembly method of fuel cell of this invention is explained in figure, carbon plate which is shown in Figure 11 which

プレート(ガスプレート及び冷却プレート)1'、シールプレート10'、ナフィオン膜11'触媒電極14'等の平面形状を120mm×140mmの長方形とし、その四隅の内の一隅、図に於いて右上の角部を部品加工時左下の角を原点(0,0)として45°のテーパで長さ2mmに面取りして目印20となし、且つこれに部品の隅部に内径5.3mmのセル組立用位置決め穴2を穿設した。

然して図12に示すように120mm×140mmの長方形の加圧板12'のセル組立用位置決め穴2に、端面を面取りした直径5mm、長さ400mmのPTFE製のノックピン13を挿入して直立させた。

#### 【0025】

次にこのノックピン13に、前記各部品即ち、カーボンプレート1'、シールプレート10'、触媒電極14'、ナフィオン膜11'、触媒電極14'、シールプレート10'、カーボンプレート1'を、各自目印20によりその表裏、方向を識別して、セル位置決め穴2にて嵌合して位置決め積層して図12に示すようにセル15'を構成し、次いでこれを所要のセル数、本例の場合29セル繰り返し積層してスタック16'を構成し、然る後図13に示すように前記各部品と同じ寸法の平面形状とし、一隅を面取りして目印20を付け、且つ隅部に内径5.3mmの組立用位置決め穴2を穿設した加工プレート17'の表裏、方向を目印20にて識別の上、セル位置決め穴2にてノックピン13に嵌合してスタック16'に重ね、ボルト18、ナット19にて締め付け固定した。

#### 【0026】

こうして組み立てられたスタック16'は、各部品が正確に位置決め保持されて精度が高く、シールも完全で、不良品の発生が無かった。

#### 【0027】

#### 【発明の効果】

以上の通り本発明の燃料電池の組立方法の1つによれば、燃料電池を構成する平板状の部品を、位置ずれすることなく、積層してセルを構成し、このセルも位置ずれすることなく積層して、高精度に且つ完全にシールしてスタックを組み立てることができる。

#### 【0028】

また、本発明の燃料電池の組立方法の他の1つによれば、燃料電池を構成する平板状の部

forms fuel cell (gas plate and cooling plate) 1', to designate seal plate 10', Nafion film 11' catalyst electrode 14' or other flat surface form as rectangle of 120 mm X 140 mm, corner among four corners, Regarding to figure, at time of part processing with the taper of 45 deg chamfer designating corner of top right as the length 2 mm origin (0 and 0) as with angle of bottom left, marking 20 and the forming, at same time in this it installed registration hole 2 for cell assembly of inner diameter 5.3 mm in corner of part.

Therefore as shown in Figure 12, in registration hole 2 for cell assembly of the adding pressure plate 12' of rectangle of 120 mm X 140 mm, inserting knock pin 13 of the PTFE of diameter 5 mm, length 400 mm which endface chamfer is done, it stoodupright.

#### 【0025】

As next in this knock pin 13, aforementioned each part namely carbon plate 1', seal plate 10', catalyst electrode 14', Nafion film 11', catalyst electrode 14', seal plate 10', carbon plate 1', identifying front and back, direction due to each marking 20, engaging in cell registration hole, 2 registration laminating, shown in Figure 12, it forms cell 15', next this in case of necessary number of cells, this example 29 cell repeatedly it laminates and forms stack 16', After that as shown in Figure 13, it made flat surface form of same dimension, as aforementioned each part chamfer did corner and attached marking 20, with marking 20 in regard to identification, engaging to knock pin 13 in cell registration hole 2, it repeated front and back, direction of processing plate 17' which at same time installs registration hole 2 for assembly of inner diameter 5.3 mm in corner to stack 16', tightenedlocked with volt 18, nut 19 and.

#### 【0026】

In this way, as for stack 16' which was assembled, each part being kept registration accurately, precision was high, also seal being complete, was not occurrence of poor goods.

#### 【0027】

#### 【Effects of the Invention】

Laminating sort above according to one of assembly method of fuel cell of this invention, without positional deviation doing part of flat plate which forms fuel cell, it forms cell, laminating either this cell without positional deviation doing, and seal doing completely in high precision, it assembles stack, it is possible.

#### 【0028】

In addition, according to other one of assembly method of fuel cell of this invention, regarding to laminate of part of flat

品の積層に於いて、各部品の表裏や設置方向の間違いを無くすことができると共に、組立終了後も外部から外観を検査することにより、良品、不良品を確認できる。

【0029】

さらに、本発明の燃料電池の組立方法のさらに他の1つによれば、燃料電池を構成する平板状の部品を位置ずれすることなく且つ表裏、設置方向を間違うことなく積層して、高精度に且つ完全にシールして不良品の無いスタッツクを組み立てることができ、その上、組立終了後外観検査により良否を容易に確認できる。

【図面の簡単な説明】

【図1】

本発明の燃料電池の組立方法の1つの一実施例に用いるカーボンプレートを示す図である。

【図2】

本発明の燃料電池の組立方法の1つの一実施例に用いるシールプレートを示す図である。

【図3】

本発明の燃料電池の組立方法の1つの一実施例に用いるナフィオン膜を示す図である。

【図4】

本発明の燃料電池の組立の1つの一実施例に用いる加圧板を示す図である。

【図5】

図4の加圧板のノックピンにてセル及びスタッツクを組み立てた状態を示す図である。

【図6】

図5に示されるスタッツクを加圧プレートを用いてボルト、ナットにて締め付け固定した状態を示す図である。

【図7】

本発明の燃料電池の組立方法の他の1つの一実施例に用いる平板状の部品を示す図である。

plate which forms fuel cell, you lose front and back of each part and mistake of mounting direction, as it is possible, it assembles after ending by inspecting external appearance from outside, good article, poor goods it can verify.

【0029】

Furthermore, laminating without making a mistake in front and back, mounting direction furthermore according to other one of assembly method of fuel cell of this invention, without positional deviation doing part of flat plate which forms fuel cell and, and seal doing completely in high precision, it assembles stack which does not have poor goods it to be possible, on that, quality can be verified easily by external appearance inspection after assembly ending.

[Brief Explanation of the Drawing(s)]

[Figure 1]

It is a figure which shows carbon plate which is used for one Working Example of one of assembly method of fuel cell of this invention.

[Figure 2]

It is a figure which shows seal plate which is used for one Working Example of one of assembly method of fuel cell of this invention.

[Figure 3]

It is a figure which shows Nafion film which is used for one Working Example of one of assembly method of fuel cell of this invention.

[Figure 4]

It is a figure which shows adding pressure plate which is used for the one Working Example of one of assembly of fuel cell of this invention.

[Figure 5]

It is a figure which shows state which assembled cell and the stack with knock pin of adding pressure plate of Figure 4.

[Figure 6]

It is a figure which shows state which tightens stack which is shown in Figure 5 with bolt, nut making use of compressed plate and locks.

[Figure 7]

It is a figure which shows part of flat plate which is used for one Working Example of other one of assembly method of fuel cell of this invention.

## 【図 8】

図 7 の部品を積層して状態を示す図である。

## 【図 9】

従来の燃料電池の組立方法に用いる平板状の部品を示す図である。

## 【図 10】

図 9 の部品を積層した状態を示す図である。

## 【図 11】

本発明の燃料電池の組立方法のさらに他の 1 つの一実施例に用いる平板状の部品を示す図である。

## 【図 12】

図 11 の部品を用いて組み立てたセル及びスタックを示す図である。

## 【図 13】

図 12 に示されるスタックを締め付け固定した状態を示す図である。

## 【符号の説明】

1	
	カーボンプレート
10	
	シールプレート
10'	
	シールプレート
11	
	ナフィオン膜
11'	
	ナフィオン膜
12	
	加圧板
12'	
	加圧板

## [Figure 8]

Laminating part of Figure 7, it is a figure which shows the state.

## [Figure 9]

It is a figure which shows part of flat plate which is used for assembly method of conventional fuel cell.

## [Figure 10]

It is a figure which shows state which laminates part of the Figure 9.

## [Figure 11]

It is a figure which shows part of flat plate which is used furthermore for one Working Example of other one of assembly method of fuel cell of this invention.

## [Figure 12]

It is a figure which shows cell and stack which were assembled making use of part of Figure 11.

## [Figure 13]

It is a figure which shows state which tightens stack which is shown in Figure 12 and locks.

## [Explanation of Symbols in Drawings]

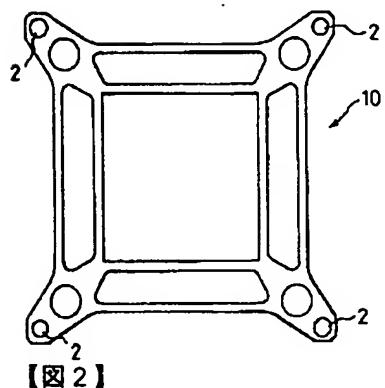
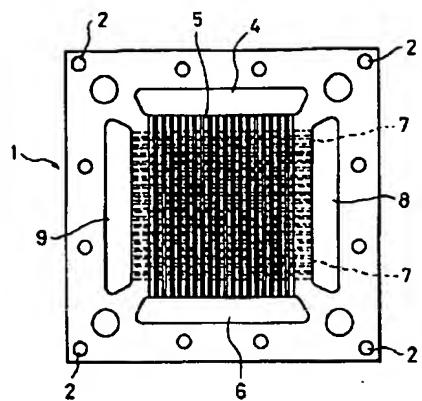
1	
	carbon plate
10	
	seal plate
10'	
	seal plate
11	
	Nafion film
11'	
	Nafion film
12	
	Adding pressure plate
12'	
	Adding pressure plate

13	13
ノックピン	knock pin
14	14
触媒電極	catalyst electrode
14'	14'
触媒電極	catalyst electrode
15	15
セル	cell
15'	15'
セル	cell
16	16
スタック	stack
16'	16'
スタック	stack
17	17
加圧プレート	Compressed plate
17'	17'
加圧プレート	Compressed plate
18	18
ボルト	volt
19	19
ナット	nut
1'	1'
カーボンプレート	carbon plate
2	2
位置決め穴	registration hole
20	20
目印	marking

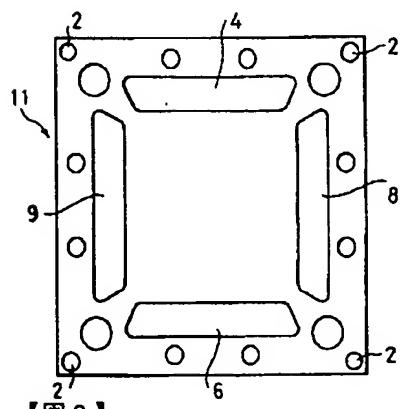
**Drawings**

【図 1】

[Figure 1]



[Figure 2]

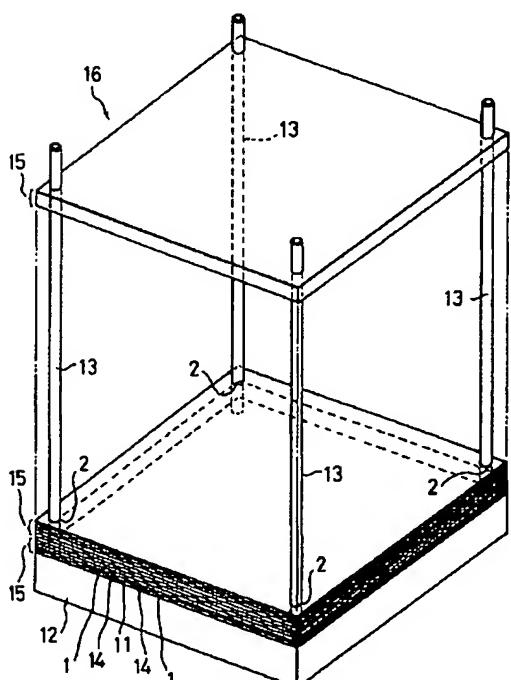
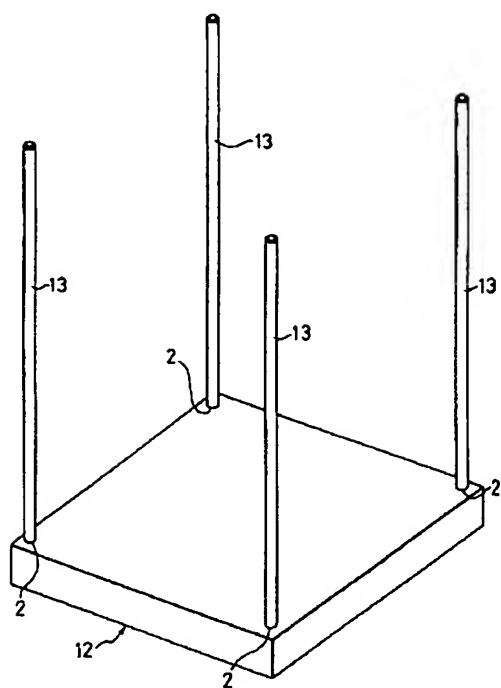


[Figure 3]

[Figure 3]

[Figure 4]

[Figure 4]

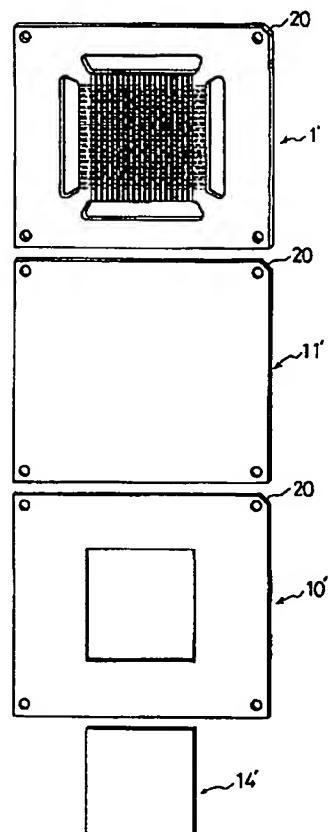
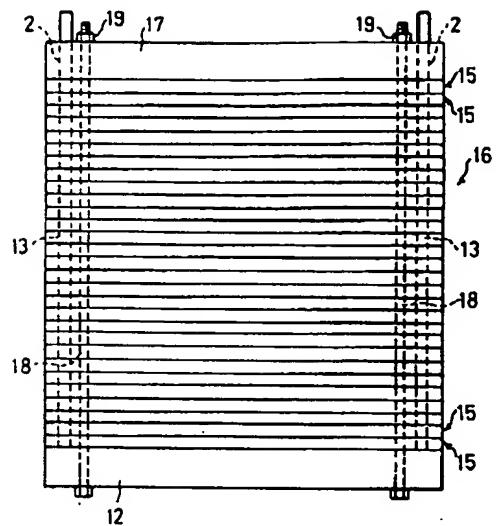


【図 5】

[Figure 5]

【図 6】

[Figure 6]

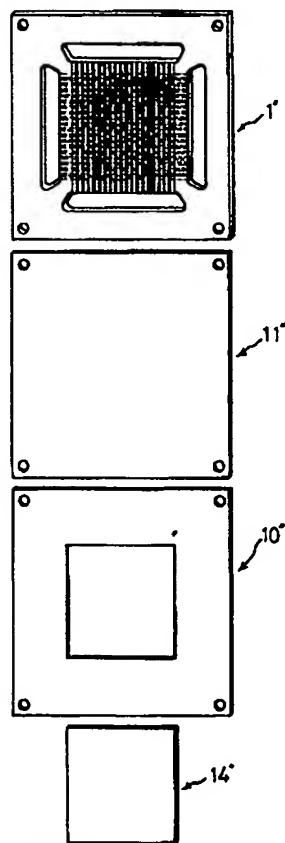
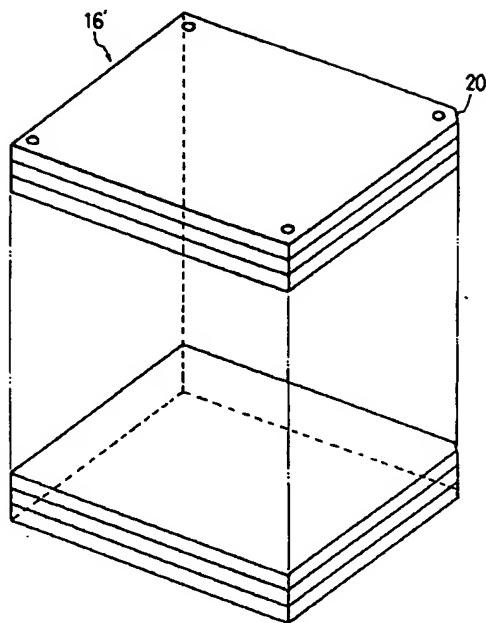


【図 7】

[Figure 7]

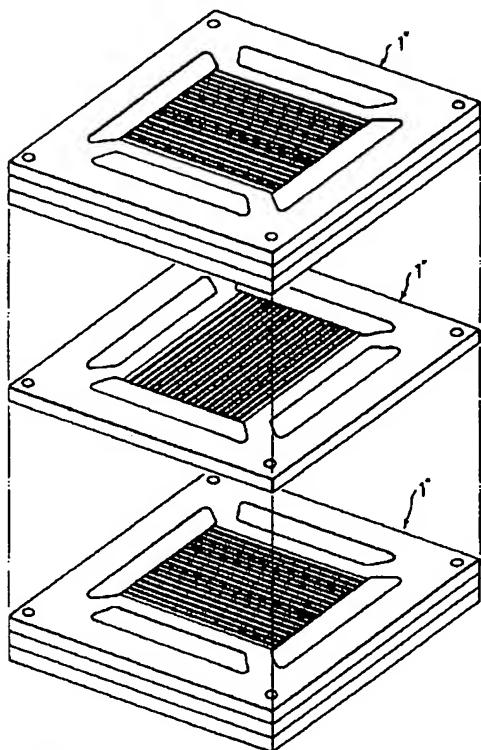
【図 8】

[Figure 8]



【図9】

[Figure 9]

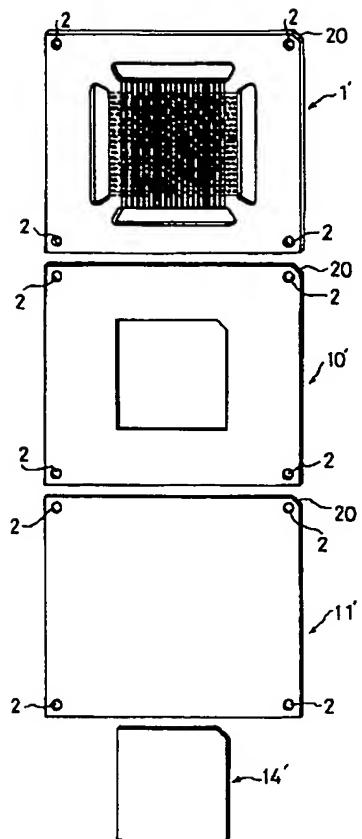


【図 10】

[Figure 10]

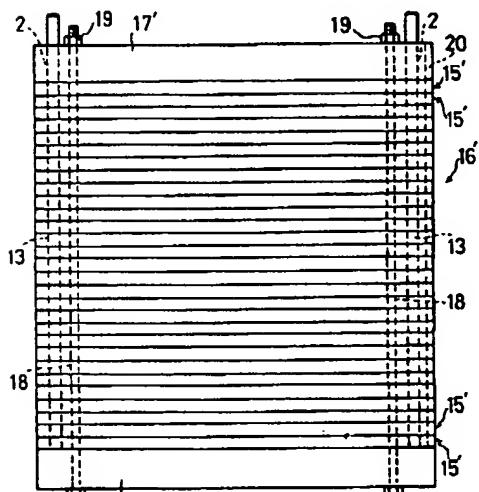
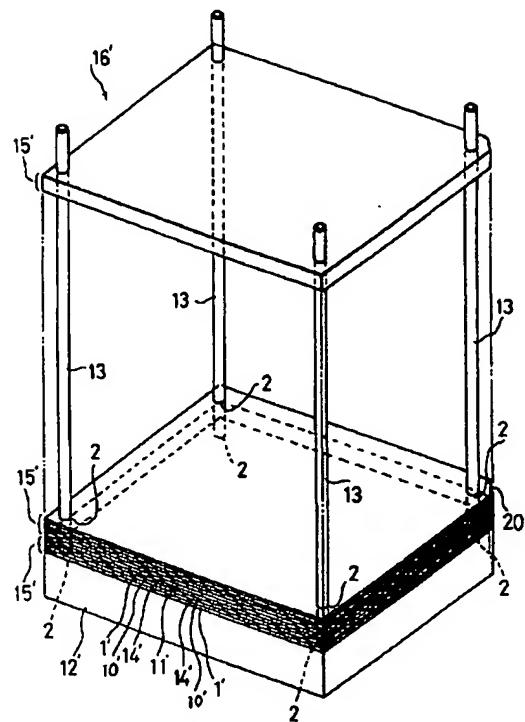
【図 11】

[Figure 11]



【図12】

[Figure 12]



【図 13】

[Figure 13]